

A review of vehicle new vehicle construction requirements that may influence or constrain the ability to produce a Routemaster style replacement vehicle

1. Iconic bus for London

The concept of an iconic bus for London is based on the broad concept of the Routemaster double deck vehicle with similar proportions and open rear platform but with a low floor and a service door towards the front for wheelchair access.

For the purpose of the EC bus & coach directive this would be a low floor vehicle double deck vehicle with a capacity between 71 to 100 passengers (assuming the capacity would not be less than the Routemaster). It would typically be a Class I vehicle but could be a Class II vehicle depending on the area available for standing passengers and number of doors.

2. Objective

To provide a critique of the EC bus & coach directive (2001/85/EC) and the Department for Transport (DfT) consultation document proposing new national regulations for buses. The critique is to cover those aspects of EC and national regulations that may constrain the concept described in paragraph 1. In addition, to identify issues to be raised in response to the DfT consultation.

Note: this document makes reference to the terms and definitions used in the EC directive as the directive also forms the basis of the DfT proposals.

3. Key definitions

“Class I”: vehicles constructed with areas for standing passengers, to allow frequent passenger movement.

“Class II”: vehicle constructed principally for the carriage of seated passengers, and designed to allow the carriage of standing passengers in the gangway and/or in an area which does not exceed the space provided for two double seats.

“Low-floor bus” is a vehicle of Class I, II [] in which at least 35% of the area available for standing passengers ([] or in its lower deck in the case of double-decker vehicles) forms an area without steps and includes access to at least one service door.

“Automatically-operated service-door” means a power-operated service door which can be opened (other than by means of emergency controls) only after a control is operated by a passenger and after activation of the controls by the driver, and which closes again automatically.

“Double door” means a door affording two, or the equivalent of two, access passages;

"Exit" means a service door, intercommunication staircase, half-staircase or emergency exit;

"Emergency exit" means an emergency door, emergency window or escape hatch.

"Service door" means a door intended for use by passengers in normal circumstances with the driver seated.

4. Bus features

Exits – the definition of "exit" and the related definition of "emergency exit" both refer to a door, window or hatch as the means to exit a vehicle. This would suggest that an exit cannot be an open aperture. Most terms are used in the context of minimum requirements designed to ensure minimum levels of safety. In this case exceeding the minimum by providing an open platform could be seen as doing more than is required but equally the purpose of the platform is to provide an entrance and exit but it would not comply with the definition of "exit".

A double deck vehicle of the capacity in question would typically have to have five emergency exits from each deck. Windows can adequately provide for this on the upper deck but on the lower deck the space available for emergency exits can be limited as these are required in addition to any service doors. An emergency exit window must be a minimum of 400000 mm² within which a rectangle of 500 mm x 700 mm can be inscribed.

If the driver's compartment does not have a suitable passage way into the passenger compartment it must have two exits not on the same lateral wall and if one is a window it must meet the requirements stated in the above paragraph. Subject to this requirement there does not appear to be any significant restrictions on a cab for the sole use of the driver.

Doors – the vehicle must have a minimum of two doors on the lower deck. This could be two service doors or one service door and one emergency door. A further requirement is that two doors must be separated by 25% of the length of the vehicle or 40% of the length of the passenger compartment on the lower deck but this does not apply if the doors are on different sides of the vehicle. In addition a double-deck vehicle of capacity 71-100 passengers must have two service doors (Class I & II) and all service doors must be on the nearside (wheelchair access is permitted in the rear face).

Unlike current regulations the EC directive does not require an off-side emergency exit door and therefore there is the option to fit such a door to overcome the door separation requirement if necessary. The width of a double door under EC rules is 1200mm which is far in excess of the 900mm required for wheelchair access therefore the open platform needs to be considered an alternative to one of the two service doors required otherwise a double door must be fitted for wheelchair access.

For Class I vehicles at least one wheelchair access door must be a service door. For type approval purposes this could be taken to mean a door that meets all the technical requirements for a service door regardless of how it is used. However, this requirement implies that wheelchair users should be able to board through the same door as other passengers. If the front service/wheelchair access door is for the exclusive use of wheelchair users then acceptance of this as an operating practice needs to be clarified.

An alternative to true open platform design and to satisfy the requirements for service doors a possible option is automatically operated service doors. These are power operated doors which are operated by passengers but the controls must be capable of being activated and deactivated by the driver. Activation and deactivation may also be by indirect means. This offers the opportunity for a vehicle which can be accessed by passengers when stationary between stops as with an open platform but by means of suitable interlocks could be designed to prevent access while the vehicle is in motion. If it were required that an attendant on the vehicle had the means of activating and deactivating the controls a suitable change to the technical requirements would be necessary. This could offer a compromise between the ease of access of an open platform and the safety of passengers trying to board or alight a moving vehicle. The directive permits a starting prevention device or requires an audible warning if a vehicle is driven with a power operated door not fully closed. Depending on the door safety measures the audible warning must activate a speeds exceeding 5 km/h.

Other issues

Overall height – type approved vehicles for sale anywhere in the EC must have a maximum height of 4m but vehicles can be EC approved for a particular Member State if that Member State permits a higher limit. Typical UK double-deck buses are around 4.2m (Routemaster 4.38m) with a permitted maximum of 4.57m. The DfT consultation document proposes no overall height limit.

Overall length – Typical UK buses and coaches do not exceed 12m for rigid vehicles although legislative changes made in recent years do permit up to 15m rigid vehicles. Double-deck buses are typically around 10m in length (Routemaster 9.14m).

Capacity – the seating capacity more so than overall capacity is driven by seat spacing, seat width requirements, accessibility requirements and the space occupied by the upper deck staircase. The bus & coach directive sets higher standards in some of these areas over current legislative requirements although few vehicles are now produced to the current minimum standards. However, the maximum overall width is now 2.55m (Routemaster 2.44m) and an increase in length over that adopted for the Routemaster and more in line with current standards could probably

offset the legislative demands such as seat spacing and staircase design without affecting the overall concept.

5. DfT Consultation

Any concessions to permit the design concept vehicle can only be considered under national legislation (EC directive amendments may be possible long term if justified). The general principle is that the new national requirements may deviate from EC requirements if they aim to ensure a level of road safety equivalent to the greatest extent practical to that of the EC requirements (Directive 2007/46/EC, Articles 23 and 24).

Approval to the new national rules will limit production to 250 per annum per vehicle type under small-series type approval or in any numbers if approved as individual vehicles. For M3 category vehicles the new approval rules become mandatory for new types from 29 April 2010.

6. Response to consultation

The following items are suggested for inclusion:

- that an open platform may be considered to be an exit (Directive 2001/85/EC, Annex I, paragraph 2.13.);
- to permit an open platform to be an alternative to a service door (the service aperture could be used as a means to determine whether the platform constitutes one or two doors) (Directive 2001/85/EC, Annex VIII, paragraph 7.6.1.1.);
- to permit part of a service door/platform to be in the rear face (Directive 2001/85/EC, Annex I, paragraphs 7.6.2.1. and 7.6.2.6.);
- to seek a reduction in the number of emergency exits on the lower deck or allow service doors or open platform to be considered emergency exits (Directive 2001/85/EC, Annex VIII, paragraph 7.6.1.4. and Annex I, paragraph 2.12);
- to permit a Class I vehicle to have a wheelchair access door that is not a service door (Directive 2001/85/EC, Annex VII, paragraph 3.6.2.).
Alternatively, to ensure that a wheelchair access door meeting the technical requirements for both wheelchair access and service door need not be used as a service door for non-wheelchair passengers during use as a PSV;
- to consider the need for an automatically operated service door to have a control to activate and deactivate the door controls by a crew member other than, or in addition to, the driver (Directive 2001/85/EC, Annex VII, paragraph 7.6.6.1.1.).